Van Arsdale Dam (Cape Horn Dam) (John Days Dam)
On the South Fork of the Eel River
Ukiah Vicinity
Mendocino County
California

HAER No. CA-53

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Western Regional Office
National Park Service
U. S. Department of the Interior
San Francisco, California 94102

HISTORIC AMERICAN ENGINEERING RECORD

Van Arsdale Dam
(Cape Horn Dam) (John Days Dam)

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Location:	On the South Fork of the Eel River in southeast quarter of Section 30, T18N, R11W, northeast of Ukiah in Mendocino County, California UTM: 4359400m N; 490000m E. Quad: Potter Valley, California
Dates of Construction:	1905-1907; altered 1963
Engineer:	Edwin Duryea, Jr.
Builder:	Eel River Power and Irrigation Company, 1905-1906 Snow Mountain Water and Power Company, 1906-1907
Present Owner:	Pacific Gas and Electric Company 77 Beale Street San Francisco, California 94106
Present Use:	Diversion dam for Potter Valley Hydroelectric Power Plant
Significance:	The Van Arsdale Dam is the oldest combined concrete gravity and earth filled dam in California. This specific type of dam is rare in both California and the United States. Its unusual design makes it distinctive of a type, period, and method and construction. The dam is apparently eligible for the National Register of Historic Places.
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Date:	February 1988

Natural Features: Landforms and Climates

The Van Arsdale Dam, also sometimes called the Cape Horn Dam (after the name given a ledge of rock in the vicinity) or John Days Dam (after an early landowner in this area), is located on the South Fork of the Eel River in the northern coastal range of California, about 17 air miles northeast of Ukiah, the county seat of Mendocino County. The topography of this section of California is characterized by medium sized ridges and mountains (up to about 7,500 feet in elevation) interspersed by wide valleys suitable for agriculture. As with most of the rest of California, the region has a mild Mediterranean climate, characterized by wet winters and dry summers. Since this dam is located in the northern coastal range; however, winter precipitation is relatively high and serious floods are relatively frequent. These natural characteristics meant that enough water existed in the South Eel River for hydroelectric development, but waters were very unevenly distributed over the year, and flooding was a frequent danger. These facts, society's needs, and, to a lesser extent, the nature of the geology and landforms along the Eel River, determined the type and size of the Van Arsdale Dam.

California's Industrialization and the Potter Valley Hydroelectric System

The Van Arsdale Dam is part of a larger hydroelectric system, called the Potter Valley system. This system had its origins in the industrialization of California during the 19th and early 20th centuries. During this period (roughly 1850-1920), California was transformed from a pre-industrial society characterized by muscle power and a relaxed pace of life to a society dominated by powerful machines and speed. By the early 20th century, electricity and oil were the power and lighting sources operating the factories and their machines in this new economy and society. By far, the cheapest source of electricity was that generated by water turbines--hydroelectric power. As long distance transmission of electricity was perfected during the 1890s and early years of the 20th century, remote areas near rivers, previously used only for recreation, mining, or small-scale agriculture were transformed into great hydroelectric workshops. Such transformations involved bringing the capital, technology, and skills characteristic of industrialized cities to these isolated locations. Such was the case with the creation of the Potter Valley hydroelectric system during the 1905-1907 years.

The Potter Valley hydroelectric system was created to bring cheap electricity to Ukiah. This involved building a dam to divert water from the south fork of the Eel River, a one-mile-long tunnel through a ridge to nearby Potter Valley, where a hydroelectric plant with its turbines, generators, transformers, and electrical transmission system were located. The diversion dam was named the Van Arsdale Dam after W. W. Van Arsdale, a San Francisco-based lumberman who was largely responsible for getting the project started.

The Creation of the Van Arsdale Dam, 1905-1907

W. W. Arsdale and his business partner, George W. Scott, incorporated the Eel River Power and Irrigation Company in early 1905. Their aim was to create the Potter Valley hydroelectric system and transmit electric power to Ukiah (Shuhaw 1930:343). In March 1905, the process of building the necessary infrastructure at the dam, tunnel, and powerhouse site began. Key parts of this infrastructural development included construction of housing for the workforce, a blacksmith shop, engine houses, a carpenter shop, a telephone line, and the installation of air compressors, steam engines, and boilers (Ukiah Republican Press, March 31, 1905).

At the same time that this construction was going on, plans for the Van Arsdale Diversion Dam were being finalized. Edwin Duryea, Jr., a San Francisco-based consulting engineer and a member of the American Society of Civil Engineers, was in charge of these plans, including designs and calculations for the dam (Fowler 1923:423; Engineering Record, March 14, 1908:292). Duryea faced some unusual design problems. Since it was to be a diversion dam, used to channel water into a tunnel, it had to be located in the general area where it was most feasible to construct the tunnel. In other words, the tunnel was seen as the most difficult piece of construction of the Potter Valley hydroelectric system and, therefore, the most favorable general tunnel location was chosen as a first step in engineering planning. Consequently, the locations of the dam and powerhouse had to fit into plans for the tunnel. The tunnel location offered only a limited number of dam location possibilities along the South Eel River, north and northeast of Potter Valley. The site chosen was called "Cape Horn," a place where a ledge of hard rock projected from the west side of the river, a considerable distance across the stream (Shuhaw 1930:344). Since there was only this rock project to anchor the dam on its western side, Duryea decided that a hybrid type of dam, combining an earth fill section with a concrete gravity section, had to be built. The earth fill section was placed on the east side of the dam site, with a long concrete wing-wall running parallel with the river. The concrete wing-wall was used to retain and protect the earth fill section (see photo in Field Records). This wing-wall then became the anchor for the eastern part of the concrete gravity section of the dam. The earth fill, which had a concrete core for added strength, was built to a height of 28 feet above the spillway and concrete gravity section to account for possible flooding. The concrete part of the dam was built on straight, rather than curved, lines, because a solid rock foundation only existed at one end. The concrete gravity part of the dam was stepped on its downstream face, due to ease in using forms during construction (Engineering Record, March 14, 1908:291; see Photo Section and Map 1, Pacific Gas and Electric Company, 1970, in Field Records).

Most of the Van Arsdale Dam was constructed during 1905, but work was suspended in mid-November 1905, due to the onset of the winter rains. It was expected

that the dam would be completed in early 1906, but a corporate reorganization followed the disastrous San Francisco earthquake, and the fire of April 1906 delayed completion until the summer of 1907 (Shuhaw 1930:345; Engineering Record, March 14, 1908:292). The new company, which actually completed and put into operation the Potter Valley hydroelectric system, was called the Snow Mountain Water and Power Company. It was based in San Francisco and had as prominent leaders not only Van Arsdale and Scott, but also Senator Charles N. Felton and E. S. Pillsbury of a prominent San Francisco law firm (Shuhaw 1930:343-345).

Although the Van Arsdale Dam was finished in mid 1907, other tasks remained to be completed. A fish ladder was built around the dam to allow salmon and steelhead to complete their upriver runs. An egg-collection station was also later built at the site. The Potter Valley hydroelectric system did not go on line until early 1908 (Ukiah Republican Press, April 3, 1908:1).

Since its completion, the Van Arsdale Dam has seen only minor modifications and changes. Over the years, the concrete section of the dam has been seriously eroded, losing two or three inches of its surface. In 1963, the concrete wing-wall retaining the earth fill section of the dam was strengthened by the addition of tension anchors and recently rip-rap was added to the downstream end of the earth fill part of the dam (Bird 1987).

The Van Arsdale Dam Today

The Van Arsdale Dam is still in use as a diversion dam. It is 520 feet long, 283 feet of this being the concrete gravity section and 237 feet being the earth fill section (Pacific Gas and Electric Company 1984:19). The concrete section stands 63 feet above the bedrock of the south fork of the Eel River and the earth fill portion stands 59 feet above the bank where it was constructed. There is rip-rap on the upstream and downstream sides of the earth fill part of the dam and gunite on the crest of the earth fill. The concrete gravity dam has a 60-inch outlet pipe existing near its base with a hydraulically-operated gate valve at its entrance (see Map 1, Pacific Gas and Electric Company, 1970, in Field Records). The photo section illustrates how the dam appeared in mid 1987.

Near the dam on the west bank of the Eel River stands a fish ladder and steelhead and salmon egg-collecting station operated by the State of California's Division of Fish and Game (see Photos in Field Records). Due to a loss of integrity, these features are not historically significant and are not part of this HAER report (Shoup 1987).

In sum, the Van Arsdale Dam is today a significant example of the early dam builder's art. It is the oldest California example of a rare type of dam, a combined concrete gravity and earth fill dam (Mermel 1963:2-13). Its age, unusual design, and good integrity have apparently made it eligible for the National Register of Historic Places.

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